JOURNAL
OF THE EAST AFRICA NATURAL HISTORY
SOCIETY AND NATIONAL MUSEUM

6th AUGUST 1979 No. 168

NOTE ON LITTORAL ALGAE FROM MOMBASA, KENYA

Jon Knutzen
Norwegian Institute for Water Research, P.O. Box 333, Blindern, Oslo, 3 Norway
and
Erik Jaasund
Institute for Biology and Geology, University of Tromsö, 9001 Tromsö, Norway

INTRODUCTION

Published records of benthic algae from the Kenya coast are rather scarce (Gerloff 1960; Taylor 1966, Isaac 1967, 1968 and 1971; Moorjani 1969, 1970). From the Mombasa area there are a few reports (Taylor 1966, Isaac 1971). A field guide to the intertidal seaweed communities of East Africa has recently been published (Jaasund 1976), the nomenclature of which is used here. (See also Jaasund 1977 a, b, c.).

Observations were made September-October 1974 and 1975 as part of a water pollution and waste disposal study for the municipality of Mombasa, conducted by Norconsult A/S for the Kenya Ministry of Local Government. The intention was to find out if there were any symptoms of pollution and to obtain a preliminary documentation of the algal flora with regard to possible effects from future sewage outfalls.

The algae were collected by hand and skin diving in the tidal zone of the following localities (Fig. 1).

St. 1 Fort Jesus, coral rock with few live corals.
St. 2 Reef flat outside Kenya Beach/Bamburi Beach.
St. 3 Rock localities in the lagoon of Kenya Beach/Bamburi Beach.
St. 4 Ras Junda, Port Tudor: Silted rock and rock pools.
St. 5 Shelley Beach, reef flat towards the harbour entrance.
St. 6 Nyali Bridge, muddy flat mingled with rock and gravel.

In addition, an introductory survey was conducted of rocky shores in Port Kilindini (fig. 1).

RESULTS AND COMMENTS

Algae recorded from the above stations are listed in Table 1.

Relatively poor algal communities were present in the *port and creek area* (represented by St. 4 and St. 6). In Port Kilindini observations of macroalgae were limited to few and small specimens of *Ulva*, *Rhizoclonium* and *Enteromorpha*. Inconspicuous amounts of blue-greens intermingled with diatoms were common on piers and the quite silted rocky shores.

Several factors may contribute to the sparse algal growth in the creek environment: Dominance of muddy flats with scanty occurrence of rock substrate, generally sheltered habitats presumably favourable for mobile grazers, and also the exposure of the intertidal algae to the combined stress of high temperature and drying or silting and low light transmission.

Whether the relatively low nutrient content has any significance is uncertain. If so, growth of benthic algae may be locally useful as indicators of fertilisation in the future. It would be premature, however, to regard the abundance of *Ulva* spp. and *Enteromorpha* at St. 6 as an example of this. Substrate conditions may be a more important factor.

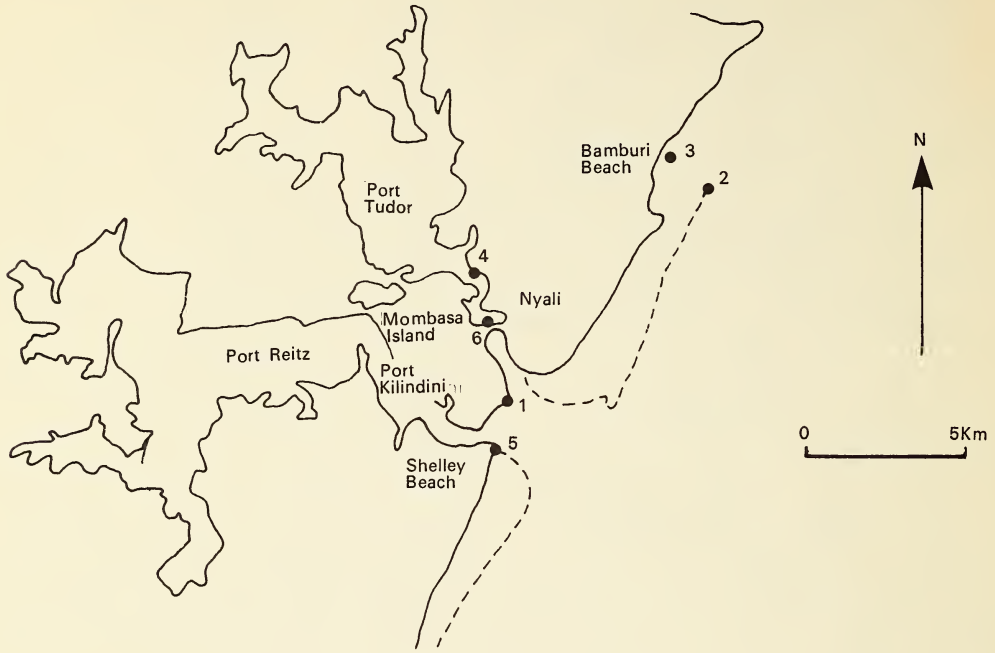

Figure 1. Sampling stations.

It is possible that some pollution by oil slicks has put a restraint on algal growth in part of the creek area (Kilindini Harbour).

Except for the sandy flats the *lagoon environment* (St. 3) is mostly sublittoral with some rock heads protruding above the sand-covered bottom. On the whole, angiosperms play a more dominant role than seaweeds. Even so, conspicuous algal covers were present, particularly in the lower littoral of the slope from the reef flat. These associations were largely comprised of *Sargassum* spp. and *Halimeda* spp. In addition to the tabulated species (St. 3), the following were found as drift weed on the beach: *Boodlea composita* (Harvey) Brand, *Chaetomorpha crassa* (C.Ag.) Kütz., *Sargassum subrepandum* (Forsk.) J.Ag., *Sphacelaria furcigera* Kütz., *Gelidiopsis intricata* (Ag.) Vickers and *Colpomenia sinuosa* (Roth) Derbes & Solier.

The beach sand was somewhat contaminated by tar lumps of various size, but the lagoon community of benthic algae did not seem to be affected.

The *reef flats* (St. 2 and St. 5) and the rocky flat below Fort Jesus (St. 1) showed rich algal growth; a large number of species taking advantage of the variable habitat of these localities. The complex community of the midlittoral is best characterized as a mosaic, with no clear zonation. The most striking algal element was the genus *Ulva*, with at least three abundant species (*U. fasciata* Delile, *U. pulchra* Jaasund and *U. reticulata* Forsk.). *U. rigida* C. Ag. f. *tropica* was also commonly occurring. Often the species grew beside each other or the reticulate forms were entwined with the others. In spite of their somewhat patchy occurrence the *Ulva* species alone, or together with other chlorophyceans, often gave the reef flats a green appearance.

The other algae generally had a more uneven occurrence, perhaps with the exception of the ubiquitous, dark brown *Cystoseira myrica* (Gmelin) C.Ag. Among red algae, *Laurencia papillosa* (Forsk.) Greville, *Gracilaria* spp., *and Yamadaella cenomyce* (Decaisne) Abbott were the most prominent. *Padina* spp. and *Halimeda* spp. were commonly encountered, the former particularly in rock pools. *Turbinaria* and *Hypnea* spp. could also be common but not abundant. The prominence of the above algae is in accordance with observations further south in Kenya and in Tanzania.

No signs of pollutional effects were observed at the reef platform localities. *Dictyosphaeria cavernosa* (Forsk.) Börgesen were present but in modest amounts. This alga is observed to have caused damage to reefs by smothering of the corals after invasion presumably triggered off by eutrophic conditions (Johannes 1972).

A special association of algae was abundant in the splash zone and down to somewhat below high water level, mainly at shady localities of over-hangs (St. 1) or sloping and silted cliffs (St. 4). This association consisted of *Bostrychia tenella* (Vahl) J. Ag., *Catenella opuntia* (Goodenough & Woodw.) Greville, *Caloglossa leprieurii* (Mont.) J. Ag. and *Murayella periclados* (J. Ag.) Schmitz.

TABLE 1

Littoral algae collected in the Mombasa area 1974–75

Algae marked x are not in previously published records for Kenya.

	Species	Stations 1	2	3	4	5	6
	Rhodophyceae						
	Acrocystics nana Zanardini					X	
	Amansia glomerata C. Ag.		X				
	Amphiroa fragilissima (L.) Lamouroux		X				
x	*Amphiroa rigida* Lamouroux					X	
x	*Bostrychia radicans* Montagne				X		
	Bostrychia tenella (Vahl) J. Ag.				X		
x	*Caloglossa leprieurii* (Mont.) J. Ag.				X		
	Carpopeltis rigida (Harvey) Schmitz	X					
	Catenella opuntia (Goodenough & Woodw.) Grev.				X		
	Centroceras clavulatum (C.Ag.) Montagne					X	X
x	*Ceramium brevizonatum* Petersen					X	
x	*Ceramium masonii* Dawson		X				
x	*Ceramium taylorii* Dawson		X				
x	*Champia irregularis* (Zanard.) Hauck			X			
	Champia parvula (C.Ag.) Harvey		X				
	Chondria armata Okamura	X					
	Chondrococcus harveyi J. Ag.		X				
	Chondrococcus hornemanni (Lyngb.) Schmitz		X				
x	*Dasya elongata* Sonder		X				
x	*Endosiphonia clavigera* (Wollny) Falkenberg		X				
x	*Galaxaura obtusata* (Ell. & Soll.) Lamouroux		X				
	Galaxaura tenera Kjellman		X				
	Galaxaura subverticillata Kjellman		X				
	Gelidiella acerosa (Forsk.) Feldmann & Hamel	X				X	
x	*Gelidiella tenuissima* Feldmann & Hamel				X		
x	*Gelidium* cf. *heteroplatos* Börgesen						X
	Gracilaria corticata J. Ag.	X	X				
x	*Gracilaria fergusonii* J. Ag.					X	
	Gracilaria salicornia (J. Ag.) Dawson	X			X	X	
x	*Griffithsia tenuis* C. Ag,		X				
	Haliptylon subulata (Ell. & Sol.) Johansen		X				
	Halymenia venusta Börgesen		X				
	Hypnea cornuta (Lamour.) J. Ag.			X			
	Hypnea esperi Bory		X	X			
	Hypnea hamulosa (Turn.) Montagne		X				
	Hypnea musciformis (Wulf.) Lamouroux		X				
x	*Hypnea pannosa* J. Ag.	X					
	Jania adherens Lamouroux		X				
x	*Laurencia intermedia* Yamada					X	
	Laurencia papillosa (Forsk.) Greville		X			X	
	Leveillea jungermannioides (Mart. & Her.) Harvey		X	X			
	Liagora mauritiana Börgesen		X				
x	*Lophosiphonia reptabunda* (Suhr) Jaasund						X
	Lophosiphonia sp.				X		
x	*Polysiphonia crassicollis* Börgesen		X				
x	*Spyridia hypnoides* (Bory) Papenfuss		X	X			
	Spyridia filamentosa (Wulf.) Harvey			X			
	Yamadaella cenomyce (Decaisne) Abbott					X	

TABLE 1 CONTINUED

Species	Stations 1	2	3	4	5	6
Phaeophyceae						
Cystoseira myrica (Gmelin) C. Ag.	X	X	X		X	
Cystoseira trinodis (Forsk.) C. Ag.		X	X			
Dictyota cf. *pardalis* Kützing			X			
Dictyota bartayresii Lamouroux sensu Vickers		X				
x *Ectocarpus rhodocortonoides* Börgesen					X	
Hydroclathrus clathratus (Bory) Howe			X		X	
Padina boryana Thivy (=*P. commersonii* Bory)		X		X		
Padina gymnospora (Kütz.) Vickers		X	X	X	X	
x *Sargassum aquifolium* (Turn.) J. Ag.				X		
x *Sargassum* cf. *binderi* Sonder	X		X			
Sargassum duplicatum J. Ag.		X				
Sargassum ilicifolium (Turn.) J. Ag.	X	X				
Sargassum spp.		X	X		X	
Spatoglossum asperum J. Ag.	X					
Sphacelaria sp.					X	
Stoechospermum marginatum (C. Ag.) Kützing	X					
Turbinaria conoides (J. Ag.) Kützing					X	
Turbinaria decurrens Bory	X	X				
Turbinaria kenyaensis Taylor				X	X	
Chlorophyceae						
Caulerpa fastigiata Montagne					X	
Caulerpa serrulata (Forsk.) J. Ag. em. Börgesen				X		
Chaetomorpha crassa (C. Ag) Kützing	X					
Chlorodesmis fastigiata (C.Ag.) Ducker		X				
x *Cladophoropsis sundanensis* Reinbold	X					
x *Codium dwarkense* Börgesen		X				
x *Codium geppii* Schmidt		X				
Dictyosphaeria cavernosa (Forsk.) Börgesen	X	X			X	
x *Enteromorpha kylinii* Bliding sensu Dawson						X
Halimeda discoidea Decaisne			X			
Halimeda incrassata (Ell.) Lamouroux	X	X				
Halimeda macroloba Decaisne			X			
Halimeda opuntia (L.) Lamouroux			X	X		
Halimeda renschii Hauck		X	X			
Ulva fasciata Delile		X	X		X	X
x *Ulva pulchra* Jaasund					X	
Ulva reticulata Forskaal	X	X			X	X
Ulva rigida C. Ag. f. tropica	X	X			X	

REFERENCES

Gerloff, J. 1960. "Meeresalgen aus Kenya, I, Cyanophyta und Chlorophyta". Willdenowia, 2, 4: 604–627.

Isaac, Wm. E. 1967. "Marine Botany of the Kenya Coast. 1. A First List of Kenya Marine Algae". Journal of the East Africa Natural History Society and National Museum. 26, No. 2 (114): 75–83.

————1968. "Marine Botany of the Kenya Coast. 2. A Second List of Kenya Marine Algae". Jl. E. Afr. nat. Hist. Soc. natn. Mus. 27, No. 1 (116): 1–6.

————1971. "Marine Botany of the Kenya Coast. 5. A Third List of Kenya Marine Algae". Jl. E. Afr. nat. Hist. Soc. natn. Mus. 28, No. 122: 1–23.

Jaasund, E. 1976. Intertidal Seaweeds in Tanzania. First edition. University of Tromsö (Norway): 159 pp.

————1977a. "Marine Algae in Tanzania V". Botanica Marina XX: 333–338.

————1977b. "Marine Algae in Tanzania VI". Bot. Mar. XX: 405–414.

————1977c. "Marine Algae in Tanzania VII". Bot. Mar. XX: 415–425.

Johannes, R.E. 1972. "Coral Reefs and Pollution". Pp. 364–375 *in* "Marine Pollution and Sea Life" (ed. M. Ruivo). Fishing News (Books) Ltd. London 1972. 624 pp.

Moorjani, S. A. 1969. "A Note on the Possible Reproductive Structures in Kenyan *Udotea orientalis* A. and E. S. Gepp, (Chlorophyta)". Jl. E. Afr. nat. Hist. Soc. natn. Mus. 27, No. 3 (118). 227–229.

————1970. "Notes on Kenya *Acetubalaria* Lamouroux, (Chlorophyta)". Jl. E. Afr. nat. Hist. Soc. natn Mus. 28, No. 1 (119): 47–52.

Taylor, R. Wm. 1966. Notes on Indo-Pacific Turbinarias. Hydrobiologia 8: 91–100.

(Received 31 October 1978)

Published by The East Africa Natural History Society, Box 44486, Nairobi, Kenya and Printed by International Aeradio Limited, P.O. Box 19022, Nairobi.